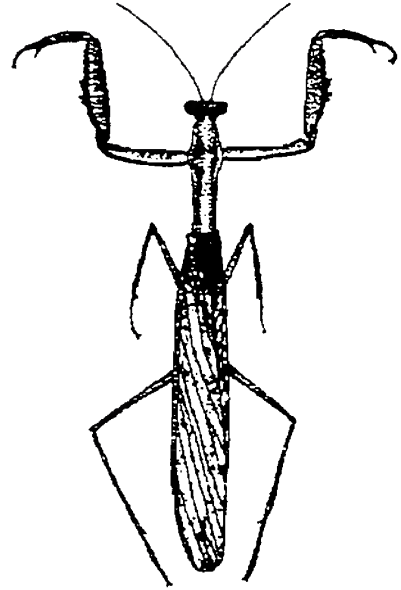


Mantis Study Group Newsletter 11

February 1999

Newsletter Editor
Phil Bragg
8 The Lane
Awworth
Nottingham
NG16 2QP

Membership Secretary
Paul Taylor
24 Forge Road
Shustoke
Coleshill
Birmingham B46 2AU



Editorial

Yesterday I started with "As you will probably have noticed already, this issue is rather thin.". However, an hour later the postman delivered an article from Martin Rowley so I quickly phoned him and asked him to send me a copy on disk. Martin's disk arrived this morning, and by coincidence a disk from Andy Lasebny arrived in the same mail delivery. The result of this is that the newsletter has doubled in size this morning!

Despite the doubling in size, this newsletter is still rather thin, so please will everyone try to write something for the newsletter. Without your contributions there will not be a newsletter!

Exhibitions

The next scheduled exhibition for which we have a stand booked is Kettering Insect Fair on Sunday March 21st.

Other dates to note are:

West of England Creepy Crawly Show, Newton Abbot racecourse, Devon. Saturday 10th July 1999 and Sunday 21st November 1999.

British Tarantula Society Show, Wood Green High School, Wood Green Road, Wenesbury, West Midlands (2 minutes from J9 of the M6) from 1030 to about 1630 on Sunday 16th May 1999.

Oldham Creepy Crawly Show, Queen Elizabeth Hall, Oldham. Open 1200-1700, 6th June 1999. Adults £1.00, children free. We have not booked a table for this, if anyone wants to run a stand for the MSG at this event please contact me for more details.

Change of e-mail address — Paul Taylor.

Please note that the Membership Secretary, Paul Taylor has changed his e-mail address. The new address is PaulT@shustoke.swinternet.co.uk.

Membership discounts

Members are reminded that they can obtain 10% discount from Perigrine Livefoods when purchasing livefood, frozen food and supplements. Perigrine Livefoods have a wide range of different sized crickets etc. Perigrine Livefoods, P.O. Box 45, Loughton, Essex, IG10 2NF, U.K. have a 24 hour order line: 0800-919631, and a customer services and advice line: 01992-815605; e-mail: perigrinedirect@compuserve.com. To qualify for your discount mention that you are a MSG member and quote your MSG number when ordering.

Mantids on the internet — Paul Taylor.

The MSG now has its own web page, you can find it at www.prayingmantis.co.uk.

Mantids are becoming very popular on internet pages, with some brilliant graphics for you to look at and even download. One such page is <http://home5.inet.tele.dk/crypto/mantiegg2>. Another useful page is Graham and Janice Smith's homepage, <http://freespace.virgin.net/graham.smith/19>.

For those of you interested in phasmids, the Phasmid Study Group now has its own web page at www.stickinsect.com.

Mantis with a taste for coffee — Penny Jackson.

On holiday in the south of France, I found a female, green *Mantis religiosa* which I took back to England. A few weeks later, it was in the same room as a cup of coffee in which it took great interest, trying to grab the cup although it was several metres away. When the coffee had been drunk, apart from a few drops at the bottom of the cup, we let the mantis crawl in. It actually drank some of the coffee!!

Mantids will try to eat almost anything if they see it move, or if you put it in their mouth, thinking that it is food (this includes bits of foam!). I did not think mantids even drank water, so can anybody explain why they like coffee? In case you are wondering, the coffee did not harm the mantis and it lived several more months and even laid an ootheca shortly after the incident with the coffee.

[Editor's note: Bearing in mind the mantis was French, and the traditional French breakfast is coffee and a bread roll, I am not surprised that the mantis drank coffee. If we had British mantids I am sure they would happily drink tea, and tuck into bacon, sausage and eggs!]

Mum of the mantids — Robert Penny.

When I received the November newsletter I saw an advert for *Sphodromantis lineola*. I rang up the man and asked for two. They were very cheap so we suspected they would be small nymphs. When they arrived they were in small film boxes. I was at school so my mum received what she thought were two little nymphs. My mum is also scared of creepy-crawlies. She then opened up the package and took the two film boxes upstairs into my insect/animal room. She saw an empty tank and an empty cricket box - you know, the things you get crickets in. She opened up the film box and out came this big leg. She quickly shut the lid and ran downstairs and put on her Marigolds (gloves). She was more worried about the mantids staying in the pot than her phobia of insects. When I got home she had separated the mantids into two different boxes. When we thought the mantids would be small nymphs we received sub-adults, which I thought was great!

P.S. Mum said next time can you send them before the school holidays so they will come in the holidays!

Mantis communication — Janice & Graham Smith.

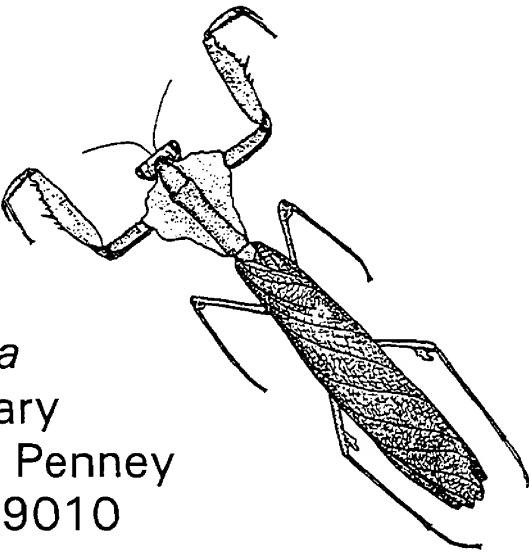
For some time now we have been observing forms of sign language with some species of mantids that we keep: *Creobroter* spp., *Pseudocreoboter wahlbergi* and *Popa spurca* in particular. This sign language seems to serve as a way of showing that the mantids are of the same species and so avoid some intraspecific cannibalism. This behaviour shows up in our cages of species kept in groups but does not show in all species: *Polyspilota aeruginosa*, *Sphodromantis lineola*, and *Tenodera aridifolia sinensis* seem to show little more than panic

when meeting with one of their own species. We are now studying this behaviour (using models to emulate and promote responses to it) and will supply data to the MSG as it develops. We would also like to hear from other members with any corresponding work or observations. Keep watching those mantids, you never know what you will find!

Mantis Photos — Graham Smith.

I am at present compiling a photo reference (on disk for now, but soon to be on the MSG homepage) of as many species as possible so how about sending me your photos for inclusion; all photos will be returned (or you can send them by e-mail). This work once completed (or as far as possible, I feel this will be an on-going project with regular updates) will be put onto CD for computer users, or can be printed for fellow MSG members without computer access. I can be e-mailed at graham.smith19@virgin.net, telephoned on 01494-446130, or write to Graham Smith, Metamorphosis, 28 Greaves Road, High Wycombe, Bucks, HP13 7JU.

[Editor's note: I assume Graham means only species in culture since printing for "members without computer access" would mean printing 4000 photos to cover males and female of all the known species!]



Wanted
Deroplatys desiccata
will pay if necessary
contact Robert Penney
on 0161 969 9010

Advert designed by Matthew Garside, Ferriby School, Breadsall, Derbys. Drawing by Phil Bragg.

The trouble with *gemmatus* — Martin Rowley.

I recently acquired six adult *Creobroter gemmatus* from a friend, Andrew Lau. There were four females and two males. One of the males seemed as if it did not have long to live and was not very active. Before he sent them to me he expressed a problem with both of the males. The healthy male seemed to have no interest in the females and would not attempt to mate at all. Since I have had a lot of good experiences and successes, Andrew hoped that I would have more luck with them than he had. I tried several methods of trying to get them to mate. At first I just left them to it on a good-sized houseplant that I have always found effective when pairing

mantids. I refer to it as my Mantis Shrub. I put the female on the shrub and allowed her to climb up a bit. I then placed the male a sensible distance behind the female. The male seemed to look in the female's general direction and started to climb after her. He stopped about 5cm away from the female and then dashed past her. It looked as if he realised that the female saw him and decided not to risk it. I tried him with all of the females with no success.

Next I tried a distraction method, I put them on the shrub as before but this time I distracted the attention of the female by feeding her a couple of medium sized crickets. It had the same result as before, the male just ran past the female ignoring her completely. I tried the same with the other three females but still no luck.

I was getting stuck for ideas and I was just staring at my other mantids in their cages in hope of inspiration and then I realised that mantids slightly sway side to side when on approach to their prey in order to avoid detection. I tried to incorporate this to my situation, so I placed them on the shrub as before but this time I used a pocket sized fan and held it above the shrub and watched the mantids below. The female was stood still but the male started his approach and started to show this swaying motion. Things were looking hopeful until I was disappointed when the male did the same thing again. But this time I knew for sure the female did not see him coming. I had the same result with the other three females.

I was starting to think that there must be something wrong with the male. I was wondering if he was infertile. I hoped not, so I tried again this time using competition as a ploy to try and get one of the males to mate with the females. I put them on the bush as before but this time putting the old male nearer to the female. I gained nothing from trying this with all the females. I reported back to Andrew of my failure and asked him if it would be OK to sacrifice the old male in the hope that the male would be interested. All was looking well, the female was chewing on the old male and the healthy male was making his approach. Unfortunately all did not go to plan, the healthy male decided to fly over the top of the female: nearly being attacked.

I was out of ideas and decided to consult more experienced members of the MSG. The first person I went to was Phil Bragg. I went to him because Andrew Lau told me that he got the *Creobroter* from Phil. Phil told me that he had no problem with breeding them except for this generation, he was facing the same problem and told me that a couple of others had expressed similar complaints. He apologised for not being able to help and suggested a few people to talk to. I then consulted Graham Smith since I knew that he had been keeping *Creobroter*, but I was not sure which ones. I explained to him my situation, about having one reluctant male and four ready females. He told me that all of his *Creobroter* spp. mated in the dark. He also told me that he would try to find some adult male *C. gemmatus* for me since the odds are against this male mating with all four females. I thanked him and prayed that his advice would work.

I made a fine nylon netting cover for this Mantis Shrub in case I had to leave them to it for a while. So I waited until it went dark and I placed the mantids on the shrub and placed the cover on checking on them every hour. Three hours later I found that the female had just eaten the male's head. It looked like that it could have happened just seconds before I checked but still it was too late.

I have a few questions for other MSG members:

- * Is there any other MSG member out there with more experience with *Creobroter gemmatus*? Can they explain the peculiar behaviour of the male? If so Phil Bragg and myself would love to hear an explanation.
- * Does anyone have any males of *gemmatus* that show interest in the females?

If you can either of these questions please respond through the *MSG Newsletter*.

If you have any male *Creobroter gemmatus* available please let me know since I have four females that are starting to lay unfertilised oothecae.

If you can help please contact me on 01706-881485.

The Green Man — Clive Curtis.

Here is an account of a novice's encounter with an African praying mantis nymph, *Sphodromantis* sp.

After purchasing the Collins Gem Birds book at Kew Gardens last Easter and seeing eighty different species of birds in the ensuing six weeks, I bought the Collins Gem Insect booklet and collected some twenty types of insects.

That gave me the idea of buying a mantis (something that I saw when hitch-hiking in Spain in 1966, but failed to see in Asia or America - no doubt because I was not looking for them!) and I ordered one from *Petsmart* warehouse here in Brentford for \$4.50. I was surprised that the only insects that they had in stock were two tarantulas and that they had no booklet on mantids.

It hung from the ventilated lid of its vivarium at home for twenty hours. As soon as an fly was introduced it took a lively interest but I found it puzzling that it stayed high up when its quarry soon began walking around the circumference, on the gravel. After a good while I found that a capture had been made and everything was soon devoured, wings and all!

As soon as the second fly was being introduced a plunking sound was heard and the mantis was seen on the gravel, but facing the wrong way. Some time later it was low on the plastic vegetation, along came the fly and it was duly snatched. It ate six flies in the next four hours, they could not see the mantis at all. I caught the flies in a coffee jar, the best attractant being fresh dog's faeces.

Using a 2x and 8x magnifying glass it seemed certain that the mantis' eyeballs were rotating in binocular vision since two tiny dots resembling pupils were swivelling together, but it became apparent that they were following the movements of my head, not of the magnifying glass - they were reflections! Under 8x magnification the grid pattern of hundreds of parts of the compound eye was visible. I was surprised that the mantis was strongly attracted up a stick towards torch light when it had been static.

A cockroach control officer visited at this time and identified an insect that I had found outside as an Oriental Cockroach (*Blatta orientalis*) which are the worst pests because they can climb. He told me that he once put a cockroach in a jar with a scorpion and it shot straight out, spraying to kill the cockroach killed the scorpion as well. He could not explain the apparent eyeball rotation of the mantis.

While in my hand one day the mantis shot out a little pellet resembling picture I had seen of stick insect eggs, but on dissection it proved to consist of the undigested remains of fly skins (akin to own pellets).

One day it moulted and became 25% bigger than its original 34mm length. Having done angling before, I thought to hang maggots on thread from the lid and it ate 24 in the following eight days, sometimes holding one in each arm and gulping them down like hamburgers!

Having read the booklet *An introduction to rearing praying mantids* by Phil Bragg, I counted its abdominal segments and sexed it as a female, six segments and expected an adult length of 7cm. An article in the MSG newsletter states that they can live for eight months.

Further frustration! Just as mealworms were obtained the "Green Man" stopped eating again, eight days after the last moult. Mealworms may be more convenient since they do not turn into pupae [as quickly as maggots], which I surmise would not be eaten.

placed in a 3l coke bottle the pupae derived from the maggots have just begun to emerge as flies. I suppose suitable non-messy food for them would be cake or bran, maggots and flies drown in the liquid from degrading chicken skin.

The Butterfly House, Syon Park, were no help regarding the capture of more exotic prey - they referred me to the supplier of pooters (sucking tubes for collecting beetles). A wasp in an upstairs bus window could have been taken - if a jam jar had been available.

The Orchid Mantis - *Hymenopus coronatus* — Andy Lasebny.

June 6 1998 - Received orchid mantis nymph, *Hymenopus coronatus*, about 1 month old. It is about 25mm long, (difficult to measure since it keeps its abdomen up.) I do not know if it is a male or female, but since it is already this large after two moults, it may be a female. It is white and pale pink, and its eyes turn deep pink at night.

June 17 - Not being sure of the humidity and moisture requirements of this species, I have been varying conditions slightly. Today I sprayed water directly on it and it was drinking - my seven weeks old *Sphodromantis lineola* nymphs do not seem to drink at all when I spray them with water. Apparently the orchid mantis requires more water. I have it in a cylindrical cardboard container, with a full height, semi-circular opening cut into it for good ventilation. This is covered with fibreglass screen mesh, and has a plastic snap lid. Inside is a layer of potting soil and an artificial (silk) plant. I have been varying the diet, using fruitflies, small moths, and crickets. The moths are sometimes caught in mid air if I happen to drop one right near it. Otherwise, it has not been particularly active. At first, it spent most of its time on the plant, but now it stays on the screen of the container near the top, probably because it noticed that its food usually climbs up there.

June 20 - After the mantis ate a medium sized house fly, I noticed that its wing stubs are raised up almost horizontally, as opposed to curved along side the body: a sure sign that it is about to moult. It is also ignoring the small moth I put in for it to eat, so it should moult soon.

June 24 - The mantis has moulted, and what a surprise, it's an adult male! This means it could not have possibly been only one month old when I received it. I was a little suspicious about its age and sex when I noticed the wing stubs - usually these are not noticeable until the last two moults. Its small size also made me think it may be a male, but since I was told it was not very old, I assumed it was a female since it was already that large after only a month. And I just thought the wing stubs appear earlier on this species. However, it was really a last instar male. He is very small - only about 3cm long.

June 25 - The first day after moulting, he was not interested in eating for over 24 hours. This evening, however, he ate a small cricket and seems to be doing well. The temperature today was up to 32°C in the room, so I made sure that he had enough water. I hope this is not too hot, but I do have a fan blowing in the room to keep the air circulating, all day during this heat wave.

July 6 - The person who gave me the mantis called with bad news - the nymph he had, which was larger and most likely a female, had just died unexpectedly. It was not yet an adult and he was waiting for another moult. The mantis seemed fine up until the last day. He found it dead on the bottom of the cage the next day. There were no warning signs at all. What could have gone wrong here? We really need to know more information about this species. Did it eat something that was contaminated with pesticides or parasites? Was the water in the area bad for it? Was there too much chlorine, or did it have the wrong kinds of minerals? Should spring water be used, or even distilled water? Did it need more ventilation? (It was kept in a glass tank with a screen top). It was also moved to another tank into a different room, where it was about 3°C cooler. Could the change itself have caused a problem? Was better ventilation needed, such as a fan blowing on it?

August 10 - After calling several MSG members during the month of July, I found out that the orchid mantis has a very short lifespan, especially the male. His adult lifespan is only 4-6 weeks on average, with some going up to two months. No one else I spoke with has an adult female available. One person I know has a final instar nymph that is most likely a female, but it is now a race against time to get this one to become an adult before the male's lifespan is over. The odds of the male living long enough in order to be able to mate with this female are not good. All those who have kept this species tell me the same thing: that they are having a hard time

getting the males and females to reach adulthood at the same time. The males that hatch from one egg case die before the females become adults. I am following the advice of some people who are telling me to feed the mantis less, only every two or three days. This should prolong his lifespan a bit. I had been feeding him daily up until about two weeks ago. Maybe this will work. I now give him a few small flies, which he takes longer to catch now, and does not always finish. Another bit of advice I was given by a group member who has had previous success with these was to keep the males cooler to make them take longer to reach adulthood and to live longer in general. Unfortunately, the temperature in mid July was as high as 35°C in the room he was in, even with a fan blowing constantly. This high temperature did not seem to affect any of the mantids in any negative way, however.

September 24 - He has now been an adult for three months. I have no idea why he has lived this long, contrary to what everyone has told me. He still gets a fly or moth every two or three days. The person who had another nymph could not keep it alive: it never even became an adult.

October 24 - No change, he is still alive.

November 24 - Yes, it's true, he is still with us, and just keeps on going. He has outlived several *Sphodromantis lineola* females, (which are supposed to be long lived), outlived a male *Tenodera aridifolia sinensis*, and a male *Tenodera angustipennis*; and the last two species hatched in June, right at the time *Hymenopus coronatus* was almost an adult.

December 24 - No, this entry is not about Christmas eve, but another milestone - this little mantis has now been an adult for 6 months. Flies and moths are now in short supply or non-existent, but small crickets seem to be adequate. A week ago, I found a moth on an unusually warm night, and he ate most of it, even though it was about as big as he is. It seems that when it comes to flying insects, this species of mantis does not care how big the prey is. But he will not eat crickets larger than a certain small size.

January 24, 1999 - Though he is showing signs of slowing down, he is still here, but does not eat very much, only about twice a week. He has now outlived all the *Tenodera* spp. All that remains for him to compete with (out of those mantids that are of approximately the same age) is a male *Sphodromantis lineola*.

February 5 - Early in the morning, I go to check on the mantis, and he is up in his usual spot near the top of the cage. I find a small moth in the room, and he eats it. Later that evening, when I get home from work, I see that he is, for the first time, on the bottom of the cage. I open it to see what is going on, and take him out for a closer look. It is almost over, he is very weak and is barely moving. His eyes, which are normally a light pink and turn dark at night, are dark early.

February 6 - This little mantis finally dies of old age - very old age. What is really interesting is how he was healthy and alert until almost the very end, and was able to catch his own food easily. Most mantids deteriorate quite a bit before, and are unable to catch anything toward the end. His total time as an adult was seven and a half months - longer than any species I had except for a female *Sphodromantis lineola*, which was an adult for eight months, only two weeks longer. I never had any New Jersey species live this long. The longest was a *Tenodera aridifolia sinensis* female that was an adult for six months. I think that these observations of the orchid mantis in captivity show that it has far more potential than we realize. Though the male was supposed to be very short lived, there are exceptions. If I had not been told that these were supposed to be short lived, I would have assumed this is normal. I would like to see some statistics on how long other individuals have lived in captivity; does anyone out there have any such information? I hope this documentation helps at least a small amount in contributing to the knowledge about the requirements of this species. This is the first one of these I ever had, but I must have done something right to keep him alive this long, though I am not really sure what.

Possible explanation for short lifespan in *Hymenopus* males — Phil Bragg.

Andy Lasebny's article on pages 6-7 of this newsletter raises an interesting point about lifespan in *Hymenopus coronatus*. It is very likely that the "normal" lifespan for a male *Hymenopus coronatus* is similar to that of the female. However, captive conditions are not "normal". In other words: males often die early because people rear them in unsuitable conditions.

Some years ago a similar situation was found with the phasmid *Carausius sanguineoligatus*, everyone said the males always died quickly, long before the females were adult; it was suggested that this was a mechanism to prevent inbreeding. However, I collected this species in Borneo and successfully reared it for several generations and found that the males always lived as long as the females. After investigating the rearing conditions of people that had been unsuccessful I eventually concluded that they had been keeping the insects too dry. The reason why only the males died is that the males are exceptionally slender and hence have a much lower body mass, therefore they have very small stores of water and food in their bodies. Although all phasmids are sexually dimorphic, with the males usually much more slender than the female, it is more pronounced in *C. sanguineoligatus* than in most other species; therefore the males are less able to cope with environmental stress.

Similarly, with *Hymenopus coronatus* the sexual dimorphism is extreme; although I do not have any live specimens to check, based on their size, I would expect the body mass of the male to be no more than one tenth of the female's. Rearers that find *Hymenopus* males dying long before the females have almost certainly not got the conditions quite right. Incorrect humidity is not necessarily the cause in every case: but it is probably the most likely, and an easy one to change.

The coexistence of *Mantis religiosa* and *Empusa fasciata* in a shared habitat

— Karl Kral.

For about three years I have been studying, from various points of view, the coexistence of the two mantids *Mantis religiosa* (Mantidae) and *Empusa fasciata* (Empusidae) in a natural meadow, situated where the Slovenian Karst plateau descends steeply to the gentle flysch valleys of the Gulf of Trieste. The boulder-strewn meadow, about three hectares in size, has partially Mediterranean vegetation, with scattered shrubs and bushes.

Even during my first transects, in mid-May, of the relatively steeply-sloping terrain (so rough as to necessitate the use of hiking boots), I discovered one of the possible explanations of how these two predatory insects are able to get along with one another, despite being competitors for food, and perhaps even mutual prey. [*M. religiosa* consumes virtually everything which it is able to capture, even conspecifics; whereas *E. fasciata* is at least not cannibalistic (see below)]. It was apparent that the two mantids inhabit different storeys of this relatively confined habitat; thus, they should scarcely interfere with one another [see also observations by Kaltenbach (*Zool. Jb. Syst.* 90, 1963) on the Iberian peninsula]. I found the approximately two centimetre long *M. religiosa* larvae (measured from the head to the end of the abdomen) primarily in the lower storey, in dense grass; and the at least six centimetre long *E. fasciata* adults in the upper storey, in shrubs and bushes. However, patience and a little luck were necessary in order to discover the latter. Luck was required, since because of its bizarre shape (characterized, like that of the related *E. pennata*, by a mitre-like helmet) and the yellowish-green striped pattern of the extremities, *E. fasciata* is so perfectly camouflaged among the branches as to be noticeable only when in motion.

The differing life cycles of the two mantids, and the associated food supplies, could, I presume, have led to this vertical colonization of the common habitat. Thus, in the autumn, *M.*

religiosa females deposit oothecae mostly in sheltered locations, e.g. under rocks; and in the first warm spring days, the larvae hatch out and disperse themselves throughout the protective grass. There they come upon small insects and the likewise freshly hatched larvae of locusts and grasshoppers. In contrast, *E. fasciata* larvae, having overwintered in the pre-adult larval stage, moult in the warm spring sunshine to become adults. These head for the flowering shrubs and bushes, for example broom bushes, in order to lie in wait there for the various insects which visit the flowers. On several occasions, I was thus able to observe an *Empusa* female (distinguishable in that the antennae are not feathered, as are those of the male) hanging under a blossom, and record with my video camera the capture of an approaching honeybee or bumblebee, while the prey was still in flight. It is evident that *E. fasciata* is able to make this type of spectacular capture because of its ability to turn its head and raptorial legs simultaneously toward its prey, while keeping the rest of the body motionless, even when the prey is located at more than 90° to the side (*M. religiosa* can turn its head, but not its raptorial legs.). *E. fasciata* then strikes with lightning speed. The captured prey is seized and turned so that the sting is pointing away, and thus presents no further danger. Then the meal begins. Several insects may be caught and eaten one after another. Food requirements can be considerable, particularly in the case of sexually mature females. If able to mate with one of the males fluttering past, the female then soon lays fertilized eggs, and when she dies or is devoured the next generation is already on the way in the oothecae.

In the height of summer it is the larvae of *E. fasciata*, now around two to three centimetres long, which must coexist with the up to seven centimetre long sexually mature *M. religiosa* adults. This also seems to present no problem, since the *Empusa* larvae, like the adults, live mainly in the bushes. The coloration of the *Empusa* larvae matches that of the now desiccated vegetation; although striped, like the adults, the larvae are gray-brown rather than yellowish-green. *M. religiosa*, on the other hand, is primarily to be found lying in wait for grasshoppers in the dense grass. Furthermore, the two species seem to exhibit predatory behaviour at different times of day (although I have not yet been able to make a thorough investigation of this). *M. religiosa*, particularly on hot days, can continue to be active after sunset, and *E. fasciata* can be active during the night. The question is to what extent *E. fasciata* adults are able to fly about at night in May, when the nights are still cool. If they do so, when in flight they presumably use an auditory organ sensitive to ultrasonic vibrations, in order to protect themselves from the bats which hunt by means of high-frequency echolocation, and which inhabit the surrounding cliffs in great numbers. Such auditory organs have been found in other mantids, and are normally unpaired, situated between the back legs. To the best of my knowledge, in this particular case, this question has not yet been investigated (see the interesting reports by David Yager in MSG Newsletters 4 to 7).

Last summer, I observed that on extremely hot days not only did *M. religiosa* seek protection from the scorching sun in the dense grass, but, evidently for the same reason, *Empusa* larvae were also to be found there; thus, both species could then often be found side by side. However I had the impression that here the protective behaviour itself, which is manifested in an energy-conserving apathy, is the factor which prevents *M. religiosa* from posing any real threat to the *Empusa* larvae. In fact, in this type of situation, I could observe no predatory behaviour. Or, because of the bizarre shape of *Empusa* larvae, atypical of insects, (raptorial legs angled beside the bent head so as to form a line with the elongated helmet; long thin thorax, which appears still longer in contrast with the extremely bent and thereby seemingly greatly shortened abdomen; four long thin walking legs splayed apart) and because of their rocking and jerky movements, are the thin *Empusa* larvae not recognized by *M. religiosa* as prey, but dismissed as being only moving branches? Is it possible that the *Empusa* larva does not constitute an effective visual stimulus for the triggering of predatory behaviour in *M. religiosa*? Conversely, because

they capture only insects in flight, *E. fasciata* adults may perhaps pose no threat at all to *M. religiosa* larvae; being wingless, mantis larvae would then not be considered as prey. Regarding these and additional topics of investigation (e.g. the ways in which the visually-controlled predatory and locomotory behaviour is adapted to the different storeys of the habitat), I am still left with many unanswered questions. However I have no doubt that there are colleagues in our Mantis Study Group who have answers to one or another of these questions. I would welcome any suggestions or contributions to discussion. My E-mail address is: karl.kral@kfunigraz.ac.at.

Mantis abstracts

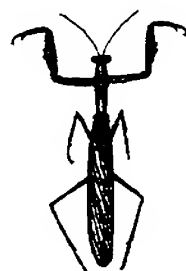
The following are abstracts from papers published recently, or in some cases details of the paper but without an abstract. The papers are in English unless otherwise indicated. The editor would be grateful for copies of any recently published papers so that abstracts may be included in this section of the newsletters.

Moon, T.Y & Yoon, I.B. (1997) List of Blattaria, Mantodea and Phasmida deposited in the Korean Entomological Institute. *Entomological Research Bulletin*, 23: 55-57.

Blattaria, Mantodea and Phasmida accumulated in Korean Entomological Institute were examined and classified. A small number of specimens in good condition were carefully chosen and registered as vouchers for future works, and preserved in separate boxes. Identified are 6 species belonging to 3 genera and 2 families in Blattaria, 4 species belonging to 3 genera and 1 family in Mantodea, and 3 species belonging to 3 genera and 3 families in Phasmida amongst the known fauna in Korea. Therefore, the species kept in the Korean Entomological Institute represent respectively 87.5% in Blattaria, 100% in Mantodea, and 60.00% in Phasmida of the species diversity recorded so far in Korea.

Yamawaki, Y. (1998) Responses to non-locomotive prey models by the praying mantis, *Tenodera angustipennis* Saussure. *Journal of Ethology*, 16(1): 23-27.

Adult females of the praying mantis *Tenodera angustipennis* were presented with computer-generated images, and the attractiveness of "non-locomotive" prey models was examined. Mantises fixated and struck the "body and leg" model (consisting of an immobile black square on a white background with 2 black lines oscillating randomly at its sides) more frequently than the "leg" model (only oscillating lines) or the "body" model (static square only). This indicates that the model consisting of a static object and moving lines effectively elicits mantis strike behaviour, although it is "non-locomotive."



An Introduction to Rearing Praying Mantids

by P.E. Bragg.

An Introduction to Rearing Cockroaches

by P.E. Bragg.



Prices: £2.50 each plus postage (20p UK; 70p Europe, £1.10 worldwide).

Order from: P.E. Bragg, 8 The Lane, Aysworth, Nottinghamshire, NG16 2QP, U.K.